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[74.03] The Temporal Activity of Io's Hot Spots: Recent results from Galileo

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The Galileo spacecraft has observed the activity of Io's hot spots since June 1996. Data from Galileo's NIMS and SSI, combined with those from ground-based telescopes, HST, and Voyager, can be used to characterize Io's hot spot activity. We examine the characteristics of hot spots - how they differ in terms of duration of activity; presence or absence of plumes and duration of plume activity; presence or absence of ephemeral red deposits around hot spots; magma temperature; and variations in power output with time. Up to Galileo's orbit C20 (May 1999), 75 active volcanic centers are known on Io (these results will be updated as we obtain data from Galileo's C21 orbit, so far the closest approach to Io). Repeated observations by NIMS and SSI show that 29 hot spots have activity that persisted for longer than one year. These persistent hot spots are particularly important for studying Io's volcanism because they are likely to represent major pathways of magma to the surface. Comparison of hot spot activity and plume activity shows that, with few exceptions, plume activity occurs at sites of persistent hot spots, which are mostly at low latitudes. We use NIMS data to examine these hot spots in terms of temporal variations in power output. We find that brightening and fading of hot spots are common but, in most cases, the detected variations in power output have not exceeded a factor of 2. This indicates that persistent hot spots probably have a steady rate of magma supply, which may imply subsurface structures similar to those of long-lived volcanoes on Earth.

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